

Amendments to the claims

Claims listing

This claims listing replaces all previous claims listings.

This claims listing replaces all previous claims listings.

1. (currently amended) An oil separator for use in a vehicle compressed air system, comprising:

a fixture for mounting said oil separator to a vehicle;

an oil separator cartridge connected with said fixture for coalescing oil in a first flow of air that is supplied to said oil separator; and

a recycling valve that is selectively operable in response to increases and decreases in air pressure of a control signal that is a second flow of air from the vehicle compressed air system and that is separate from said first flow of air that is supplied to said oil separator for removing coalesced oil from said oil separator.

2. (original) Apparatus as set forth in claim 1 including a sump mounted adjacent said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.

3. (original) Apparatus as set forth in claim 2 wherein said outlet port 90 directs oil out of said recycling valve and returns it to an engine or compressor with which said oil separator is associated.

4. (original) An oil separator as set forth in claim 2 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.

5. (original) An oil separator as set forth in claim 1 wherein said recycling valve includes a piston movable in a cylinder in response to a control air pressure to open said recycling valve.

6. (original) An oil separator as set forth in claim 4 wherein said recycling valve includes an inlet port in fluid communication with said cartridge through a sump and also includes an outlet port, said piston blocking communication between said inlet port and said outlet port when said valve is in a closed position, said piston being movable in response to a control air pressure from the closed position to an open position enabling fluid to flow out of said sump through said inlet port and said outlet port.

7. (original) An oil separator as set forth in claim 6 wherein coalesced oil is removed from said sump under the influence of compressed air in said sump when said valve is in the open position.

8. (original) An oil separator as set forth in claim 7 wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

9. (original) An oil separator as set forth in claim 1 further including a sump and wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

10. (original) An oil separator as set forth in claim 1 wherein said fixture is a single block of metal and includes a supply port for allowing air from a compressor into

said fixture and a delivery port for allowing the air to exit said oil separator after being coalesced.

11. (original) An oil separator as set forth in claim 1 wherein said fixture includes an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned, said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

12. (original) An oil separator as set forth in claim 11 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

13. (original) An oil separator as set forth in claim 1 further including a pressure relief valve in fluid communication with said oil separator cartridge for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

14. (original) An oil separator as set forth in claim 13 wherein said pressure relief valve creates an audible signal upon releasing air.

15. (original) An oil separator as set forth in claim 1 wherein said separator creates an audible signal in response to air pressure in said separator reaching a predetermined amount.

16. (currently amended) A method comprising the steps of:
directing a flow of compressed air of a vehicle compressed air system into a cartridge of an oil separator and through a coalescing medium in the cartridge to coalesce oil in the compressed air;
collecting the coalesced oil in a sump attached to the oil separator; and
selectively operating opening a recycling valve attached to the sump to enable coalesced oil to flow out of the sump in response to increases and decreases in air

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pressure of a control signal from the vehicle compressed air system that is separate from the flow of compressed air that is directed to the cartridge of the oil separator,

17. (previously presented) A method as set forth in claim 16 further comprising the step of forcing the coalesced oil to flow out of the sump through the recycling valve under air pressure from the sump.

18. (original) A method as set forth in claim 16 wherein said opening step includes directing a control air signal to said recycling valve and moving a piston in response.

19. (original) A method as set forth in claim 16 wherein said directing step includes directing compressed air to flow into the cartridge through a plurality of inlet ports having a flow area that is preselected not to limit air flow,

20. (original) A method as set forth in claim 19 wherein the plurality of inlet ports extend at right angles to an initial air flow direction in the oil separator.

21. (original) A method as set forth in claim 16 further comprising the step of releasing air from a safety relief valve on said oil separator in response to air pressure reaching a predetermined level.

22. (original) An oil separator for use in a vehicle air system, comprising:
a fixture for mounting said oil separator to a vehicle; and
an oil separator cartridge connected with said fixture for coalescing oil in air supplied to said oil separator;

said fixture including an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;

said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

23. (original) An oil separator as set forth in claim 22 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

24. (original) An oil separator as set forth in claim 22 wherein said fixture is made from a single piece of metal.

25. (original) An oil separator as set forth in claim 22 further including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

26. (original) An oil separator as set forth in claim 25 wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

27. (previously presented) A vehicle compressed air system, comprising:
a compressor for compressing air;
an air dryer for drying the compressed air;
a fixture for mounting said oil separator to a vehicle; and
an oil separator in line between the compressor and the air dryer, including an oil separator cartridge attached to said fixture for coalescing oil in air supplied to said oil separator;
said fixture including an inlet port for allowing air from [[a]] said compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;
an air line for delivering air from said fixture to said air dryer;

said fixture including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount;

wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

28. (canceled)

29. (original) An oil separator as set forth in claim 27 wherein said fixture includes a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

30. (original) An oil separator as set forth in claim 29 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

31. (original) An oil separator as set forth in claim 27 further including a recycling valve for removing coalesced oil from said oil separator.

32. (original) An oil separator as set forth in claim 31 including a sump connected with said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.

33. (original) An oil separator as set forth in claim 32 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.

34. (previously presented) An oil separator as set forth in claim 1 wherein as compressed air flows through the oil separator cartridge, oil is separated from the compressed air, condensing into large oil droplets;

the fixture having an exit passage that receives compressed air and oil droplets from the cartridge, the compressed air and condensed oil flowing through the exit passage into a sump in which the oil droplets are deposited and accumulated, clean compressed air exiting from the sump through a sump exit passage in said fixture.

35. (new) An oil separator as set forth in claim 1 wherein the first flow of air that is supplied to said oil separator flows through a coalescing medium in said cartridge on which medium particles of oil collect and coalesce.

36. (new) A method as set forth in claim 16 wherein the step of directing a flow of compressed air of a vehicle compressed air system into a cartridge of an oil separator and through a coalescing medium in the cartridge comprises collecting and coalescing particles of oil from the flowing compressed air on the coalescing medium in the cartridge.

Amendments to the claims

Claims listing

This claims listing replaces all previous claims listings.

This claims listing replaces all previous claims listings.

1. (currently amended) An oil separator for use in a vehicle compressed air system, comprising:
 - a fixture for mounting said oil separator to a vehicle;
 - an oil separator cartridge connected with said fixture for coalescing oil in a first flow of air that is supplied to said oil separator; and
 - a recycling valve that is selectively operable in response to increases and decreases in air pressure of a control signal that is a second flow of air from the vehicle compressed air system and that is separate from said first flow of air that is supplied to said oil separator for removing coalesced oil from said oil separator.
2. (original) Apparatus as set forth in claim 1 including a sump mounted adjacent said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.
3. (original) Apparatus as set forth in claim 2 wherein said outlet port 90 directs oil out of said recycling valve and returns it to an engine or compressor with which said oil separator is associated.
4. (original) An oil separator as set forth in claim 2 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.

5. (original) An oil separator as set forth in claim 1 wherein said recycling valve includes a piston movable in a cylinder in response to a control air pressure to open said recycling valve.

6. (original) An oil separator as set forth in claim 4 wherein said recycling valve includes an inlet port in fluid communication with said cartridge through a sump and also includes an outlet port, said piston blocking communication between said inlet port and said outlet port when said valve is in a closed position, said piston being movable in response to a control air pressure from the closed position to an open position enabling fluid to flow out of said sump through said inlet port and said outlet port.

7. (original) An oil separator as set forth in claim 6 wherein coalesced oil is removed from said sump under the influence of compressed air in said sump when said valve is in the open position.

8. (original) An oil separator as set forth in claim 7 wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

9. (original) An oil separator as set forth in claim 1 further including a sump and wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

10. (original) An oil separator as set forth in claim 1 wherein said fixture is a single block of metal and includes a supply port for allowing air from a compressor into

said fixture and a delivery port for allowing the air to exit said oil separator after being coalesced.

11. (original) An oil separator as set forth in claim 1 wherein said fixture includes an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned, said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

12. (original) An oil separator as set forth in claim 11 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

13. (original) An oil separator as set forth in claim 1 further including a pressure relief valve in fluid communication with said oil separator cartridge for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

14. (original) An oil separator as set forth in claim 13 wherein said pressure relief valve creates an audible signal upon releasing air.

15. (original) An oil separator as set forth in claim 1 wherein said separator creates an audible signal in response to air pressure in said separator reaching a predetermined amount.

16. (currently amended) A method comprising the steps of:
directing a flow of compressed air of a vehicle compressed air system into a cartridge of an oil separator and through a coalescing medium in the cartridge to coalesce oil in the compressed air;
collecting the coalesced oil in a sump attached to the oil separator; and
selectively operating opening a recycling valve attached to the sump to enable coalesced oil to flow out of the sump in response to increases and decreases in air

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pressure of a control signal from the vehicle compressed air system that is separate from the flow of compressed air that is directed to the cartridge of the oil separator.

17. (previously presented) A method as set forth in claim 16 further comprising the step of forcing the coalesced oil to flow out of the sump through the recycling valve under air pressure from the sump.

18. (original) A method as set forth in claim 16 wherein said opening step includes directing a control air signal to said recycling valve and moving a piston in response.

19. (original) A method as set forth in claim 16 wherein said directing step includes directing compressed air to flow into the cartridge through a plurality of inlet ports having a flow area that is preselected not to limit air flow,

20. (original) A method as set forth in claim 19 wherein the plurality of inlet ports extend at right angles to an initial air flow direction in the oil separator.

21. (original) A method as set forth in claim 16 further comprising the step of releasing air from a safety relief valve on said oil separator in response to air pressure reaching a predetermined level.

22. (original) An oil separator for use in a vehicle air system, comprising:
a fixture for mounting said oil separator to a vehicle; and
an oil separator cartridge connected with said fixture for coalescing oil in air supplied to said oil separator;

said fixture including an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;

said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

23. (original) An oil separator as set forth in claim 22 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

24. (original) An oil separator as set forth in claim 22 wherein said fixture is made from a single piece of metal.

25. (original) An oil separator as set forth in claim 22 further including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

26. (original) An oil separator as set forth in claim 25 wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

27. (previously presented) A vehicle compressed air system, comprising:
a compressor for compressing air;
an air dryer for drying the compressed air;
a fixture for mounting said oil separator to a vehicle; and
an oil separator in line between the compressor and the air dryer, including an oil separator cartridge attached to said fixture for coalescing oil in air supplied to said oil separator;
said fixture including an inlet port for allowing air from [[a]] said compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;
an air line for delivering air from said fixture to said air dryer;

said fixture including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount;

wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

28. (canceled)

29. (original) An oil separator as set forth in claim 27 wherein said fixture includes a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

30. (original) An oil separator as set forth in claim 29 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

31. (original) An oil separator as set forth in claim 27 further including a recycling valve for removing coalesced oil from said oil separator.

32. (original) An oil separator as set forth in claim 31 including a sump connected with said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.

33. (original) An oil separator as set forth in claim 32 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.

34. (previously presented) An oil separator as set forth in claim 1 wherein as compressed air flows through the oil separator cartridge, oil is separated from the compressed air, condensing into large oil droplets;

the fixture having an exit passage that receives compressed air and oil droplets from the cartridge, the compressed air and condensed oil flowing through the exit passage into a sump in which the oil droplets are deposited and accumulated, clean compressed air exiting from the sump through a sump exit passage in said fixture.

35. (new) An oil separator as set forth in claim 1 wherein the first flow of air that is supplied to said oil separator flows through a coalescing medium in said cartridge on which medium particles of oil collect and coalesce.

36. (new) A method as set forth in claim 16 wherein the step of directing a flow of compressed air of a vehicle compressed air system into a cartridge of an oil separator and through a coalescing medium in the cartridge comprises collecting and coalescing particles of oil from the flowing compressed air on the coalescing medium in the cartridge.

Amendments to the claims

Claims listing

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1. (currently amended) An oil separator for use in a vehicle compressed air system, comprising:

a fixture for mounting said oil separator to a vehicle;

an oil separator cartridge connected with said fixture for coalescing oil in a first flow of air that is supplied to said oil separator; and

a recycling valve that is selectively operable in response to increases and decreases in air pressure of a control signal that is a second flow of air from the vehicle compressed air system and that is separate from said first flow of air that is supplied to said oil separator for removing coalesced oil from said oil separator.

2. (original) Apparatus as set forth in claim 1 including a sump mounted adjacent said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.

3. (original) Apparatus as set forth in claim 2 wherein said outlet port 90 directs oil out of said recycling valve and returns it to an engine or compressor with which said oil separator is associated.

4. (original) An oil separator as set forth in claim 2 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.

5. (original) An oil separator as set forth in claim 1 wherin said recycling valve includes a piston movable in a cylinder in response to a control air pressure to open said recycling valve.

6. (original) An oil separator as set forth in claim 4 wherein said recycling valve includes an inlet port in fluid communication with said cartridge through a sump and also includes an outlet port, said piston blocking communication between said inlet port and said outlet port when said valve is in a closed position, said piston being movable in response to a control air pressure from the closed position to an open position enabling fluid to flow out of said sump through said inlet port and said outlet port.

7. (original) An oil separator as set forth in claim 6 wherein coalesced oil is removed from said sump under the influence of compressed air in said sump when said valve is in the open position.

8. (original) An oil separator as set forth in claim 7 wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

9. (original) An oil separator as set forth in claim 1 further including a sump and wherein said fixture comprises a first threaded member for fastening said oil separator cartridge to said fixture and a second threaded member for fastening said sump to said fixture, said fixture including at least one passage extending between upper and lower surfaces of said fixture for delivering air and coalesced oil to said sump for collection of the oil.

10. (original) An oil separator as set forth in claim 1 wherein said fixture is a single block of metal and includes a supply port for allowing air from a compressor into

said fixture and a delivery port for allowing the air to exit said oil separator after being coalesced.

11. (original) An oil separator as set forth in claim 1 wherein said fixture includes an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned, said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

12. (original) An oil separator as set forth in claim 11 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

13. (original) An oil separator as set forth in claim 1 further including a pressure relief valve in fluid communication with said oil separator cartridge for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

14. (original) An oil separator as set forth in claim 13 wherein said pressure relief valve creates an audible signal upon releasing air.

15. (original) An oil separator as set forth in claim 1 wherein said separator creates an audible signal in response to air pressure in said separator reaching a predetermined amount.

16. (currently amended) A method comprising the steps of:
directing a flow of compressed air of a vehicle compressed air system into a cartridge of an oil separator and through a coalescing medium in the cartridge to coalesce oil in the compressed air;
collecting the coalesced oil in a sump attached to the oil separator; and
selectively operating opening a recycling valve attached to the sump to enable coalesced oil to flow out of the sump in response to increases and decreases in air

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pressure of a control signal from the vehicle compressed air system that is separate from the flow of compressed air that is directed to the cartridge of the oil separator.

17. (previously presented) A method as set forth in claim 16 further comprising the step of forcing the coalesced oil to flow out of the sump through the recycling valve under air pressure from the sump.

18. (original) A method as set forth in claim 16 wherein said opening step includes directing a control air signal to said recycling valve and moving a piston in response.

19. (original) A method as set forth in claim 16 wherein said directing step includes directing compressed air to flow into the cartridge through a plurality of inlet ports having a flow area that is preselected not to limit air flow,

20. (original) A method as set forth in claim 19 wherein the plurality of inlet ports extend at right angles to an initial air flow direction in the oil separator.

21. (original) A method as set forth in claim 16 further comprising the step of releasing air from a safety relief valve on said oil separator in response to air pressure reaching a predetermined level.

22. (original) An oil separator for use in a vehicle air system, comprising:
a fixture for mounting said oil separator to a vehicle; and

an oil separator cartridge connected with said fixture for coalescing oil in air supplied to said oil separator;

said fixture including an inlet port for allowing air from a compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;

said fixture including a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

23. (original) An oil separator as set forth in claim 22 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

24. (original) An oil separator as set forth in claim 22 wherein said fixture is made from a single piece of metal.

25. (original) An oil separator as set forth in claim 22 further including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount.

26. (original) An oil separator as set forth in claim 25 wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

27. (previously presented) A vehicle compressed air system, comprising:
a compressor for compressing air;
an air dryer for drying the compressed air;
a fixture for mounting said oil separator to a vehicle; and
an oil separator in line between the compressor and the air dryer, including an oil separator cartridge attached to said fixture for coalescing oil in air supplied to said oil separator;
said fixture including an inlet port for allowing air from [[a]] said compressor into said fixture and a delivery port for allowing air to exit said oil separator after being cleaned;
an air line for delivering air from said fixture to said air dryer;

said fixture including a pressure relief valve in fluid communication with said inlet port for releasing air from said oil separator in response to air pressure reaching a predetermined amount;

wherein said pressure relief valve is mounted on said fixture and creates an audible signal upon releasing air.

28. (canceled)

29. (original) An oil separator as set forth in claim 27 wherein said fixture includes a plurality of ports extending from said inlet port for directing air from said inlet port into said cartridge, said plurality of ports having a combined flow area at least equal to the flow area of said inlet port.

30. (original) An oil separator as set forth in claim 29 wherein said plurality of ports extend at an angle to the direction of flow of air through said inlet port.

31. (original) An oil separator as set forth in claim 27 further including a recycling valve for removing coalesced oil from said oil separator.

32. (original) An oil separator as set forth in claim 31 including a sump connected with said cartridge for collecting the coalesced oil, said recycling valve being connected to said sump and including an inlet port for draining oil from said sump, an outlet port for removing oil from said valve, and a control port for controlling operation of said valve.

33. (original) An oil separator as set forth in claim 32 wherein said recycling valve is operable to remove coalesced oil from said oil separator under the influence of compressed air in said sump.